two sexual lines is by plant breeding.

27. The method of claim 19 wherein the hybridizing of the two sexual lines is by somatic cell hybridization.

REMARKS

Claims 1-27 are pending in the application. Claims 1, 17, 18, and 19 are amended herein for correcting typographical errors, eliminating the term "the steps of" to remove any presumption that may attach from the use of such term with respect to intent to use means-plus-function claiming, and better defining the scope of the invention. In addition, somatic cell hybridization is added to claim 18 step (e) and claim 19 step (c). New claims 21-27 are added to emphasize that hybridization can be accomplished by methods known in the art, including plant breeding and somatic cell hybridization. Support for additions to claims 1 and 17 is found at page 41, line 12, to page 42, line 10. Support for the addition of "by sexual reproduction" in claim 18, step (e), is found at page 38, line 16, to page 39, line 16 and page 42, line 11, to page 44, line 2. Support for adding somatic cell hybridization to the claims is found at page 41 of the specification, wherein the plant breeding text Poehlman, Breeding Field Crops (Van Nostrand Reinhold, 1987) is incorporated by reference in its entirety into the specification.

Poehlman contains a section that discusses somatic cell hybridization as a technique that may be used for producing hybrid plants. New claim 21 is similar to claim 1 and new claim 22 is similar to claim 17 except that somatic cell hybridization is specified as the method of hybridizing the plants. New claims 23-25 depend from claim 18 and new claims 26-27 depend from claim 19 for specifying the methods used for hybridizing parental lines or producing hybrid progeny. No new matter is added to the application by virtue of these changes.

A marked up copy of the claims, showing deletions in brackets and additions underlined, is attached hereto as Appendix A.

Applicant and the undersigned attorney respectfully thank the Examiner for the courtesy extended in granting a personal interview for discussing the state of the art and continued research on apomictic hybrids produced according to the presently claimed invention.

The only issues remaining in the parent application, U.S. Serial No. 09/018,875, was a rejection of claims 1-20 under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the enablement requirement of 35 U.S.C. § 112, first paragraph, and a rejection of claim 19 under 35 U.S.C. § 112, second paragraph. It is believed that the amendment presented herein to claim 19 obviates the rejection under 35 U.S.C. § 112,

second paragraph.

Concerning the rejection under 35 U.S.C. § 112, first paragraph, there is filed simultaneously with the present Preliminary Amendment a Declaration by John G. Carman under 37 C.F.R. § 1.132 for presenting data demonstrating the obtaining of apomictic plants according to the methods of the present invention. Dr. Carman obtained these results with plants from two genera of monocotyledonous plants, i.e., *Sorghum* (Poaceae) and *Tripsacum* (Poaceae), and one genus of dicotyledonous plants, i.e., *Antennaria* (Asteraceae).

In each genus, Dr. Carman determined that variation exists with respect to flowering responses to various photoperiods and start times and durations of female developmental stages relative to development of nongametophytic ovule and ovary tissue. For example, FIGS. 4-6 of the Declaration show differences in female developmental stages in *Sorghum*, FIGS. 8-10 show such differences in *Tripsacum*, and FIGS. 12-14 show such differences in *Antennaria*. Dr. Carman obtained delineated lines that were differentiated by their flowering responses to different photoperiods and by timing of female developmental stages, hybridized such delineated lines such that hybrids were produced, and selected hybrids that exhibited apomixis. Three genera were tested and apomictic hybrids were obtained in all three genera.

Table 4 shows the frequency of aposporous, diplosporous, and

total apomictic pistil formation in *Sorghum* hybrids produced from 12 parent lines divergent with respect to five floral development traits. Apomictic hybrids were obtained in 9 of the 12 crosses reported. In these 9 crosses where apomictic hybrids were obtained, the percentage of total apomictic pistils ranged from 2.5% to 14.3%. Table 5 shows that heterozygosity for photoperiodism (P), differences between parent lines in mean integument length at the dyad stage (dMS), and difference between the smallest parental ESI (mean inner integument length at embryo sac initiation) value and the largest parental MS (inner integument lengths at the dyad stage) value enhanced expression of diplospory. Moreover, heterozygosity for photoperiodism (P), differences between parent lines in mean integument length at the end of the tetrad stage (dESI), and difference in tetrad stage duration (dTET) enhanced expression of apospory.

Therefore, Dr. Carman showed that, using the methods of the presently claimed invention, he could predict which parent lines could be crossed to result in apomictic progeny, and when the crosses were made such apomictic progeny actually were obtained.

Thus, it is respectfully submitted that apomixis was produced by following the steps set forth in the specification. It is, therefore, respectfully submitted that the presently claimed invention is enabled by the specification, and the specification contains a description of the invention and the

manner and process of making and using it in such full, clear, concise, and exact terms as to enable any person skilled in the art to make and use the invention without undue experimentation. It is thus respectfully submitted that the presently claimed invention is in compliance with the requirements of 35 U.S.C. § 112, first paragraph.

Should the Examiner deem it advisable to conduct a telephone interview for any reason, the undersigned attorney would be most agreeable to receiving a telephone call to expedite the prosecution of the application.

For the reasons given above, Applicant respectfully requests allowance of Claims 1-27 and passage of this application to issue.

Dated this 9th day of February, 2001.

Respectfully submitted,

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APPENDIX A

Marked-Up Version of Amended Claims

1. (Amended) A method for obtaining apomictic plants from sexual plants comprising [the steps of]:

(a) obtaining at least two sets of delineated lines from a plant species or group of related plant species that are differentiated by their flowering responses to various photoperiods and by their start times and durations of female developmental stages relative to development of nongametophytic ovule and ovary tissue; and

(b) hybridizing said sets of delineated lines, recovering seed from the hybridization, sowing and cultivating said seed, and selecting hybrid lines that contain genetic material of each said set of delineated lines such that asynchronous floral development, and therefore apomixis, is conferred.

3. (Amended) The method of claim 1 wherein the differentiation in flowering response occurs across at least one member of the group consisting of short-day plants, long-day plants, dual-day-length plants, intermediate-day-length plants, [ambiphotooperiodic] ambiphotoperiodic plants, and day-neutral plants.

17. (Amended) A method for obtaining apomictic plants from sexual plants comprising [the steps of]:

(a) identifying naturally [-] occurring divergence in flowering responses to various photoperiods within a plant species or group of related plant species;

(b) obtaining two sets of lines of said plant species or group of related plant species that are differentiated by their flowering responses to various photoperiods;

(c) identifying within and between said sets of lines [lies] divergence in start times and durations of female developmental stages relative to development of nongametophytic ovule and ovary tissues;

(d) obtaining two sets of delineated lines [liens] of said species or group of related species that are differentiated by their flowering responses to various photoperiods and by their start times and durations of female developmental stages relative to development of nongametophytic ovule and ovary tissues; and

(e) producing hybrid lines that contain genetic material of each said set of delineated lines such that asynchronous floral development, and therefore apomixis, is conferred by hybridizing said two sets of delineated lines, recovering seed from the hybridization, sowing and cultivating said seed, and selecting said hybrid lines.

18. (Amended) A method for obtaining aposporic, diplosporic, or polyembryonic plants from sexual monocotyledonous or dicotyledonous plants comprising [the steps of]:

(a) identifying naturally [-] occurring divergence in flowering responses to various photoperiods within a plant species or group of related plant species;

(b) obtaining two sets of lines of said plant species or group of related plant species that are differentiated by their flowering responses to various photoperiods;

(c) identifying within and between said sets of lines divergence in start times and durations of female developmental stages selected from the group consisting of archespore formation, megasporogenesis, megagametogenesis, and early embryony relative to the development of nongametophytic ovule and ovary tissues selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall;

(d) obtaining two <u>sets</u> [set] of delineated lines of said species or group of related species that are differentiated by their

(i) flowering responses to various photoperiods such that divergence occurs within a member or across more than one member selected from the group consisting of short-day plants, long-day plants, dual-day-length plants, intermediate-day-length plants, and ambiphotoperiodic

plants, and day-neutral plants and

(ii) start times and durations of female developmental stages selected from the group consisting of archespore formation, megasporogenesis, megagametogenesis, and early embryony relative to the development of nongametophytic ovule and ovary tissues selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall such that divergence occurs within one member or spans more than one member of such female developmental stages;

(e) producing by sexual reproduction, somatic cell hybridization, or colchicine induction technique polyploid, triploid, diploid, or aneuploid lines that contain genomes, chromosomes, or genes from [teach] each said set of delineated lines such that apomixis is expressed.

19. (Amended) A method for producing apomictic plants from two or more sexual plants of the same or related species comprising [the steps of]:

(a) obtaining two sexual lines whose female reproductive phenotypes differ such that under similar environmental conditions asynchrony in female developmental schedules between the two lines occurs;

(b) making amphiploids by chromosome doubling of the sexual lines differing in female developmental schedules if said lines

are not already polyploid; and

(c) hybridizing the two sexual lines by plant breeding or somatic cell hybridization to induce apomixis, obtaining progeny from such hybridizing of the two sexual lines, and selecting apomictic plants from among such progeny.